



DUAL GLASS N type i-TOPCon MODULE

PRODUCT: TSM-XXXNEG9R.28

PRODUCT RANGE: 420-450W

450W

MAXIMUM POWER OUTPUT

0~+5W

BINNING TOLERANCE

22.5%

MAXIMUM EFFICIENCY

25
YearsPRODUCT
WARRANTY30
YearsPOWER
WARRANTY

Small in size, bigger on power

- Up to 450W, 22.5% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Reduce installation cost with higher power bin and efficiency
- Boost performance in warm weather with low temperature coefficient and operating temperature



Dual-glass Design, more secure and sustainable

- Upgraded dual glass of Vertex S, less prone to micro-cracks and scratches on the back during installation
- Fire rating class C, weather resistance, salt spray, ammonia performance which is fully applicable in coastal, high temperature, humidity area and harsh environment



Ultra-low Degradation, longer warranty, higher output

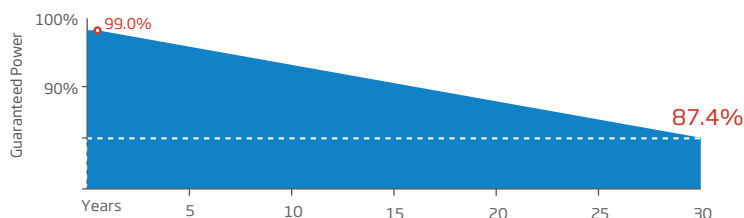
- First-year degradation 1% and annual degradation at 0.4%
- Up to 25 years product warranty and 30 years power warranty



Universal solution for residential and C&I rooftops

- Easy for integration, designed for compatibility with existing mainstream inverters and diverse mounting systems
- Perfect size and low weight for handling and installation
- Most valuable solution on low load capacity rooftops (weight similar to backsheet version)
- Mechanical performance up to 5400 Pa positive load and 4000 Pa negative load

Trina Solar's Dual Glass Performance Warranty



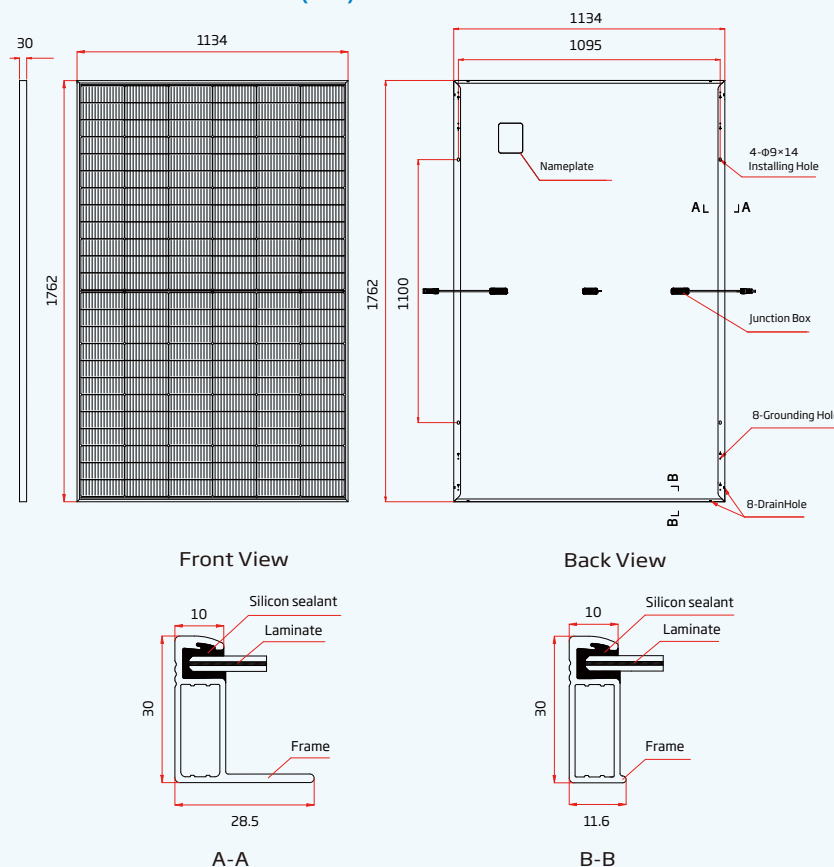
Comprehensive Products and System Certificates



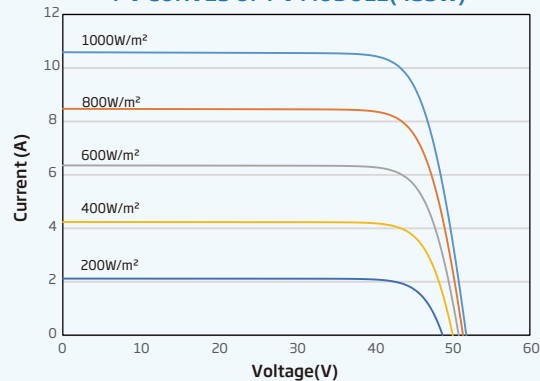
ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification
 ISO45001: Occupational Health and Safety Management System



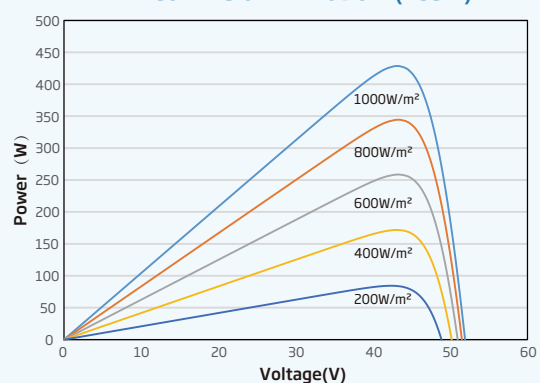
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(435W)



P-V CURVES OF PV MODULE(435W)



ELECTRICAL DATA (STC) TSM-XXXNEG9R.28(XXX=420-450)

Peak Power Watts-P _{MAX} (Wp)*	420	425	430	435	440	445	450
Binning Tolerance-P _{MAX} (W)	0 ~ +5						
Maximum Power Voltage-V _{MPP} (V)	42.5	42.9	43.2	43.6	44.0	44.3	44.6
Maximum Power Current-I _{MPP} (A)	9.89	9.92	9.96	9.99	10.01	10.05	10.09
Open Circuit Voltage-V _{OC} (V)	50.5	50.9	51.4	51.8	52.2	52.6	52.9
Short Circuit Current-I _{SC} (A)	10.53	10.56	10.59	10.64	10.67	10.71	10.74
Module Efficiency η _m (%)	21.0	21.3	21.5	21.8	22.0	22.3	22.5

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5. *Measuring tolerance: ±3%.

ELECTRICAL DATA (NOCT)

Maximum Power-P _{MAX} (Wp)	320	324	328	332	335	339	343
Maximum Power Voltage-V _{MPP} (V)	39.7	40.0	40.4	40.7	41.0	41.3	41.6
Maximum Power Current-I _{MPP} (A)	8.07	8.09	8.11	8.15	8.17	8.20	8.24
Open Circuit Voltage-V _{OC} (V)	47.8	48.2	48.7	49.1	49.4	49.8	50.1
Short Circuit Current-I _{SC} (A)	8.49	8.51	8.53	8.57	8.60	8.63	8.65

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	N type Monocrystalline
No. of cells	144 cells
Module Dimensions	1762×1134×30 mm (69.06×43.15×1.18 inches)
Weight	21.0kg (46.3 lb)
Front Glass	1.6 mm (0.06 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	EVA/POE
Back Glass	1.6mm(0.06 inches), Heat Strengthened Glass
Frame	30mm (0.06 inches) Anodized Aluminium Alloy, Black
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), Length: 1100mm/1100mm(43.3/43.3 inches)
Connector	Stabuli MC4 EVO2 / Trina Solar TS4 Plus / Trina Solar TS4

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of P _{MAX}	- 0.30%/°C
Temperature Coefficient of V _{OC}	- 0.24%/°C
Temperature Coefficient of I _{SC}	0.04%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	25A

WARRANTY

25 year Product Workmanship Warranty**
30 year Power Warranty
1% first year degradation
0.4% Annual Power Attenuation

PACKAGING CONFIGURATION

Modules per box: 36 pieces
Modules per 40' container: 936 pieces

(**Please refer to Limited Warranty Supplement that applies to the TSM-***NEG9R.28, TSM-***NEG9RC.27, Products supplied after 1st Jan 2023 and installed within Australia & New Zealand rooftop market.)